Hazardous Materials (Laboratory /Manufacturing Chemical and Biological Materials) Safety Report

USDA APHIS Wildlife Services Safety Review

Prepared for:

USDA Animal and Plant Inspection Service
4700 River Road, Unit 55
Riverdale, MD 20737

Prepared by:

Federal Occupational Health
U. S. Public Health Service
Denver, Colorado

May 12, 2008

Introduction

Federal Occupational Health (FOH) inspected USDA APHIS Wildlife Services facilities in fulfillment of the USDA APHIS Wildlife Services Safety Review, Hazardous Materials with Disease Component, as part of Wildlife Service's Program Wide Safety Review. The work was performed under interagency agreement No. A129549 (8/31/07), Statement of Work S120655. The review of this component was performed by James E. Dennison, Ph.D., CIH for FOH between January and March, 2008. Pertinent policies and documents were reviewed, and procedures and equipment for storage, inventory, use and disposal of chemicals and biological hazards, employee adherence to policy and safety procedures, use of personal protective equipment, and other applicable safety elements were reviewed.

Different Wildlife Services facilities that were reviewed have very different missions, staffing, and potential hazards. Overall, safety programs at the facilities are strong, comprehensive, and generally well implemented. No major program gaps or concerns were found. Environmental health and safety (ESH) programs can never be perfectly implemented in any organization; thus, the expectation is that they perform on a satisfactory level and strive for continual improvement. ESH programs met the satisfactory level overall but have several areas where improvement can be made. These are noted in the following discussion and recommendations. First, general observations and recommendations are presented for Wildlife Services as a whole. Subsequently, detailed observations, discussion and recommendations specific to two facilities that were inspected (the National Wildlife Research Center in Fort Collins, CO and the Pocatello Supply Depot in Pocatello, ID) are offered.

Trapping Operations

Trapping operations could not be included in the review, as they were not being performed at any facility during the time of the inspection. However, animal bites are one of the more common reportable injuries experienced by Wildlife Services staff, so potential improvement should be sought.

- Recommendation # 1. Conduct an occupational health inspection of trapping when this activity resumes.

Chemical Hygiene

Chemical hygiene (laboratory health and safety) practices were generally very good where laboratories existed. Proper laboratory work practices were followed to a high extent. Manager's were properly concerned with hygiene, and health and safety officers were experienced and appeared to have appropriate authority to deal with issues. Staff appeared to be generally knowledgeable about laboratory hazards, equipped to avoid and minimize hazards, and properly trained. Ventilation is discussed separately.

The written plans for chemical hygiene were not well defined and the following improvements are suggested.

- Recommendation #2. Address work practices and identify the Chemical Hygiene Officer (CHO) in any Chemical Hygiene Plans that do not include these.
- Recommendation #3. Review ESH SOPs annually and update or re-approve.

Training Programs

The review addressed environmental, safety and health training only; training for other purposes (e.g. security) was not reviewed. Overall, training programs were fragmented to some degree. There were a number of training classes that were provided, but not in a systematic manner in terms of content and frequency for refresher courses (if needed). Some areas and employees received training at different times and it was not typically renewed on a periodic basis. Mock spill or incident trainings would be advised for high hazard areas. Therefore, some improvements could be made, including:

- Recommendation #4. Formalize training programs for each facility or common job type in an SOP including initial and on-going training for each area.
- Recommendation #5. Job hazard analysis should be conducted for each potentially hazardous task. For those where hazards are indicated by job hazard analysis, safety procedures should be developed by the facility's safety manager in cooperation with the project manager for the activity where a hazard exists.
- Recommendation #6. Safety managers should make periodic inspections of areas where hazards exist to verify that work practices and controls are properly implemented. These inspections should be documented.

Exposures and Medical Monitoring

No significant issues were observed with respect to exposure to chemicals and biological agents that exposure assessment testing or additional medical monitoring would be needed to address.

Chemical inventory and Labeling

Chemical inventory systems varied in quality and implementation. In some cases, the system was computerized and in other cases, a manual system was in-place. Where inventory was computerized, on-going efforts to verify its accuracy should be continued. If no computerized system exists, developing one appeared to be feasible and would likely result in time savings and improvements in accuracy over the medium to long term horizon.

- Recommendation #7. Develop computerized inventory systems where they are not in place at this time.

Labeling was generally good but not always universal. Occasional examples of missing "Date Opened" and "Date Expired" labels were also observed. A draft labeling SOP is an improvement and should be completed. As this is in progress, a formal recommendation would be redundant.

Waste Management

Waste management operations also appear to be appropriate and compliant with USEPA and DOT requirements.

Hazard Communication and MSDSs

Material Safety Data Sheets (MSDS) appear to be properly handled, but the difficulties of keeping MSDS up-to-date in each facility or part of each facility with so many always-changing inventories of chemicals was evident. Where computerized inventory systems are in-place, it would be much more efficient and complete to develop a sub-system for MSDS management. By appropriate cross-referencing, the inventory system could ensure that an MSDS is available for every chemical in the inventory, ensure their availability to users, and purge them when the chemical is removed from the system, as well as save a lot of unnecessary paper waste. This recommendation could be implemented in the future if APHIS or USDA is planning to revamp the system at a higher level.

- Recommendation #8. Implement an on-line MSDS system for facilities with computerized inventory systems. This should be integrated into the USDA-wide chemical inventory system, provided that system is not years in the future.

- Recommendation #9. Update SOP for Hazard Communication to reference all products that include hazardous chemicals "including products obtained from sources other than traditional chemical suppliers."

Ventilation Systems (Chemical or Laboratory)

Generally, ventilation systems were sufficient for the stated purposes. In most cases, annual recertifications were up-to-date, but each facility should make sure that all chemical fume hoods and biological safety cabinets (BSCs) are recertified. A few cases where use restriction labels or certification labels were missing were noted to the on-site representative and should be addressed. Some hoods and BSCs have HEPA filters on supply and/or exhaust air. There were no criteria available for when pre-filters and HEPA filters needed to be changed. This should be clarified in an SOP. A system for assigning responsibility for checking the changes of the filters and documenting work performed on the systems should be developed.

- Recommendation #10. Investigate operational parameters for pressure drop on the HEPA filter, a means of checking for proper pressure drop, changes schedules for pre-filters and HEPA filters, and recordkeeping of these.

National Wildlife Research Center Site Visit

A site visit was conducted to inspect relevant areas of the National Wildlife Research Center (NWRC) located at 4101 LaPorte Ave., Fort Collins, CO. Included in this inspection were all research areas and any related areas where chemicals are used, stored, or disposed of. The site visit was conducted by James Dennison, CIH, for Federal Occupational Health (FOH). The site visit was led by Mr. Steve Greiner and Mr. John Eisemann of USDA APHIS Wildlife Services NWRC. The visit was conducted from March 24-26, 2008.

The purpose of the site visit was to review the safety program for laboratory and manufacturing chemicals and biological agents. This included review of pertinent standard operating procedures (SOPs), agency directives, internal written policies, manuals, and written plans, as well as inspecting the facility and operations within the facility for conformance to written programs and OSHA and EPA requirements. Assessment of conformance to Good Laboratory Practices or Good Manufacturing Practices was not included.

In this site visit report, various comments and recommendations have been made. Some comments that are observational or concern minor matters have not been formalized into a recommendation due to the small scope of the observation, or because they are covered by a broader recommendation made elsewhere in the report. Some other observations are covered by an optional action if there are different choices that can be made or the outcome of the problem resolution depends on information that is not available at this time. However, significant observations with formal recommendations are noted in bulleted text.

Document Review

The following documents were reviewed in connection with NWLC.

1. Current Standard Operating Procedures
2. Approval and training for BSL-3 workers and visitors (AD016.01 23 July 07)
3. BSL-3 Employee clearance database
4. NWRC Biosecurity Plan, dated 5/10/07
5. OSHA 300 logs 2002 – 2007
6. NWLC Laboratory Training, memo dated 11 Aug 2003
7. NWRC Chemical Hygiene Plan (includes SOPs for Chemical Spills, Shipment Dangerous Goods, Respirators, PPE, Hazardous Waste, HazComm, Chemical Inventory, and Fume Hoods).
8. WS Directive: Mission and Philosophy of the WS Program
9. WS Directive: NWRC (2.115)
10. WS Directive: Compliance with Federal, State and Local Laws and Regulations (2.210)
11. WS Directive: Safety (2.601)
12. WS Directive: WS Safety and Health Program (2.605)
13. Labeling Requirements SOP (draft)

14. Housekeeping SOP (draft)
15. Approval and training for BSL-3 workers and visitors SOP (AD016.01)
16. Use and Maintenance of the Sterilmatic Autoclave (IE 033)
17. BSL-3 Laundry Procedures (HS021.00)
18. Shipment of Biological Substances, Animal Specimens, and Environmental Test Samples (HS 013.02)
19. Standard and Special Practices, Safety Equipment, and Facility Procedures for Biosafety Level 2 Laboratories (HS 012.00)
20. Inventory and Storage Procedures for BSL2 Agents and Diagnostic Samples (BT 013.01)
21. OSHA Form 300, 2002-2007

Other than as noted below, the directives and SOPs appear to adequately address safety concerns at the facility.

Laboratory Chemical Hygiene

Numerous aspects of laboratory health and safety are well managed at NWRC. Exceptions are noted below, where they were observed. A chemicals hygiene program is administered by NWRC, with Mr. Steve Greiner as the Chemical Hygiene Officer (CHO). A written Chemical Hygiene Plan (CHP) is available. However, the CHP appears as a compilation of disparate SOPs covering many of the topical areas that a CHP should cover. The plan does not appear to address "work practices" adequately, and the CHO is not designated in the plan. Optionally, the SOPs could be integrated into a coherent plan, but the extant plan is probably acceptable as is. A policy that the SOPs themselves should be reviewed and updated or re-approved annually has reportedly not been adhered to. This should also be addressed.

- Recommendation #11. Address work practices and CHO in the Chemical Hygiene Plan.
- Recommendation #12. Review SOPs annually and update or re-approve.

Fume Hoods and Biological Safety Cabinets

Late model fume hoods and biological safety cabinets (BSC) were present in numerous labs. Most hoods were vented through dedicated exhausts through roof-mounted manifolds and fans with appropriate stack heights. The hoods generally all appeared clean and reasonably free of excess equipment. The hoods appeared to be sufficient for work purposes at the time of the inspection. Users appeared to use hoods properly and were familiar with use practices. The hoods and BSCs had been re-certified (tested) within the current twelve month period and labeled as passing the testing. The individual who performed the certification is currently accredited through the National Sanitation Foundation for certification of BSCs. One BSC was removed from service and another was missing a re-certification sticker (see below). There were use restrictions on two other fume hoods (see below).

Other Safety Resources

Labs and work areas appeared very well provisioned with spill cleanup supplies. Eye washes and showers were frequently present, and were reportedly tested quarterly. No issues noted.

Training

Various safety training is currently being performed, but the content of the training program is not as complete, regular, and well-defined as it should be. Training curricula needs to be flexible to allow changes or added content as deemed appropriate, yet a basic minimum set of instructional materials needs to be more clearly defined. Three types of training intervals can be envisioned: training for new hires, on-going training, and special training. NWRC is in the best position to determine the exact training content for new hires, but a suggestion would include: Laboratory safety, Respirators (for some), Personal Protective Equipment, Hazardous Waste, Inventory and Labeling, Spills, and Hazard Communication. The content can be customized for staff in different areas of the laboratory, and can be a combination of formal and on-the-job training.

On-going training should include at least Spills. Personal Protective Equipment. Respirators (for some), Hazard Communication, as well as other training deemed relevant. Special Training would cover new hazards or project-specific hazards. Obviously, some areas, including BSL-3, require additional specialized training.

It was apparent that some of these training elements were not completed with some staff. Moreover, it seemed that training was more complete in the Analytical Chemistry Project area than with some staff in other labs. Some of this training is alluded to in a memo dated August 11, 2003 (referenced above), but this memo did not constitute a clear description of what initial and on-going training was appropriate for each lab area. This lack of clarity could be addressed with a training SOP.

On-line training via "AgLearn" may be useful for on-going training needs. It is recommended that any on-line training be supplemented with formal access to live instructors or practitioners to help answer site-specific questions and with quizzes or some means to assess uptake of critical parts of the training.

Project-specific training is provided at the start of a project. The project manager determines what safety precautions are needed for a particular project. At a minimum, safety procedures for each project should be reviewed and approved by the CHO, if not developed by the CHO in concert with the project manager. For highly hazardous operations, the CHO should make periodic inspections to verify that work practices, equipment, etc. are following the plan and that employees are following all required procedures. These inspections should be documented.

- Recommendation #13. Formalize training program in an SOP including initial and on-going training for each lab area.

- Recommendation #14. Safety procedures for each research project should be developed by the CHO, jointly by the project manager and CHO, or by the project manager with review and approval by the CHO.
- Recommendation #15. CHO should make periodic inspections of laboratory areas where highly hazardous agents may be present to verify work practices and controls are properly implemented. These inspections should be documented.

Resources

NWRC has a unique mission and is a unique facility. The CHO, Mr. Steve Greiner, appears to be quite knowledgeable and active in many disparate aspects of the environmental, health, and safety programs, as well as a participant in work outside the facility. Many of the routine tasks within the facility do not require the depth of knowledge of an experience environmental professional and could be handled by more junior personnel, freeing up senior personnel time for dealing with more complex issues. The amount of time required to implement and provide on-going support for a program as complex as that at NWRC should be expected to exceed the available time for a full-time position. Therefore, complete implementation of the programs that exist, along with the recommended additions, would require additional resources. A part-time position should be funded at a junior level to leverage the existing CHO's time to implement the program. If existing staff at NWRC is not available for this, another option includes the possibility of bringing an undergraduate or graduate student/intern from the Environmental Health Department at Colorado State.

- Recommendation #16. Provide junior level support to the CHO.

Exposures and Medical Monitoring

Exposure potential to traditional chemical agents appears to be slight. No operations appeared to have sufficient exposure potential to possibly exceed OSHA Permissible Exposure Limits or ACGIH Threshold Limit Values, for chemicals that have these limits. More esoteric chemicals, as well as biological agents, are used. For these chemicals and agents, numerical exposure guidelines rarely if ever exist, and test methods to assess exposure (usually airborne, therefore air sampling methods would be needed) usually don't exist. Therefore, prudent practice generally revolves around using hygienic methods for handling these agents. As far as could be ascertained, all toxic and hazardous agents were handled in fume hoods whenever exposure was possible. Reportedly, all SOPs and research plans incorporate the latest guidance on handling such agents in laboratory settings, but the toxicity of some of the agents (e.g., samples that may contain Avian Influenza Virus) underscores the need to continue the current program of updating SOPs and research plans and following the latest guidance.

Chemical inventory

The chemical inventory system at NWRC appears to be nearly comprehensive and relatively well-followed. The facility follows an inventory system (CMITS) that offers a means to

keep track of all hazardous chemicals at the facility. Chemicals are logged into the system when received at the facility. Periodic reviews are done to keep the inventory reasonably up-to-date.

Waste Management

Waste management operations also appear to be appropriate and compliant with USEPA/Colorado/DOT requirements. Each satellite waste accumulation station appeared to have proper lists of wastes added to containers. Compliance with recording such wastes appeared to be excellent. Chemical and biological wastes as well as sharps appeared to be properly managed.

MSDSs

Hard copies of MSDS appeared to be adequately available to staff in labs and areas where chemicals were present. Staff appeared to be aware of their location and availability. Reportedly, the MSDS system is being updated by USDA. For a facility such as NWRC, where there are hundreds of different chemicals coming into and out of inventory and use, and different labs have and use different chemicals, and these change frequently, it is extremely time consuming and impractical to maintain complete MSDS records in every lab. Also, all staff has access to computers and the NWRC network. Thus, this facility is ideal for an on-line MSDS management system. Such a system would allow any user rapid access to any MSDS. The on-line database of MSDS can be updated with relative ease from the chemical inventory system, which is already translated into a computer database. Such an on-line system therefore would not only be much more efficient, but much more complete.

- Recommendation #17. Implement an on-line MSDS system for NWRC. This should be integrated into the USDA-wide chemical inventory system, provided that system is not years in the future.

Consumer products are not completely integrated into the system, even when they may contain hazardous ingredients.

- Recommendation #18. Update SOP for Hazard Communication to reference all products that include hazardous chemicals "including products obtained from sources other than traditional chemical suppliers."

Labeling was generally good but not always universal. Occasional examples of inappropriate labels were seen (Photo #19; 26; 39). Occasional examples of missing "Date Opened" and "Date Expired" labels were also observed. A draft labeling SOP is an improvement and should be completed.

Analytical Chemistry Project (ACP)

Overall, the labs in ACP appear to be well managed and maintained from health and safety aspects. About 40 staff members work in ACP, although many are not in ACP at any one

point in time. Regular training is not done, but training is provided for new hires and periodically thereafter.

BSL-2 Laboratories

At NWRC, there are five groups of laboratory rooms that are designated as Biological Safety Level 2 (BSL-2). These BSL-2 labs were inspected for conformance to CDC guidelines for BSL-2 labs, per the CDC Lab Biosafety Level 2 Checklists. These checklists were either filled out during the inspection or by the lab manager at a later date. No significant findings were reported. Microbiological work practices and equipment were in conformance with CDC guidelines where applicable. This includes procedures for handling sharps, needles, and cleanup (including personal hygiene and personal protective equipment) after work procedures occur. Access restrictions to the labs were adequate. Disposal procedures for infectious agents met the requirements for the current agents in terms of disposal, autoclaving, etc. SOPs were developed and were available for all aspects of the work although training aspects have been mentioned elsewhere. Overall, lab ventilation was in excellent condition, although minor corrections have also been mentioned elsewhere.

BSL 3 Lab

The lab was recertified in January 2008. No studies were on-going at the time of the site visit, but future studies involving West Nile Virus and other agents are in planning stages. Therefore, it was not possible at this time to review entry and exit procedure adherence. The procedures were reviewed in description and appear to be consistent with guidelines. Review of the design and construction of the BSL-3 lab and the operations, calibrations, and certification of the lab was outside the scope of the present assessment.

According to the SOP "Approval and training for BSL-3 workers and visitors," AD016.01, 23 July 07, various training must be conducted for staff employees who enter the BSL-3 lab. Appropriate recordkeeping forms are attached to the SOP for tracking the training. However, it is not indicated that refresher training is required or performed. Also, a simpler means of tracking staff that is out of date for vaccinations or training can be included. If refresher training is to be conducted, or if vaccination boosters are needed, the interval should be indicated in the Employee Database. Insert fields in the database that indicate "Next Training Due," and "Next Vaccination Due." These can be programmed in as a formula that relates to the initial completion date and required time interval. Finally, a final field may be added that either indicates "Everything complete through date" or "Employee up-to-date (Y/N)." This can also be programmed as a logical field that takes all compliance requirements into account. The advantage of adding a final field that reflects whether an employee is up to date on everything depends on how many compliance items are in the database. If there are several items, it may be difficult to reliably check every compliance date without missing an elapsed entry.

NWLC has completed mock incident training in the BSL-3 lab. This is a critical aspect of the training program and should be formalized in the SOP as training requiring a repeated exercise at some predetermined frequency (e.g., annually). Responsibility for review of the

security, training, and vaccination records should be assigned to a specific person or job functionality with a specific interval. Records of the completion of the periodic review should be kept, either in memo or checklist form.

- Recommendation #19. Conduct refresher training on critical aspects of BSL-3 protocol.
- Recommendation #20 (optional). Insert fields in the database that indicate "next training due," and "next vaccination due." Insert a final field that subsumes all compliance deadlines.
- Recommendation #21. Include mock incident training in the SOP on a periodic basis.
- Recommendation #22. Assign responsibility for periodic review of compliance with the requirements of the SOP. Save all records documenting that the review is completed as required.
- Recommendation #23. Include annual refresher training on critical aspects of the BSL-3 safety program.

At the BSL-3 entrance, magnehelic gauges were present to monitor the air pressure difference between the BSL-3 lab and adjacent areas. The lab is designed to have"negative" air pressure relative to the adjacent areas (lower pressure inside the lab) so that air will flow into the lab instead of out of the lab. The criteria for negative air pressure were not available and not indicated in the SOP. These criteria should be determined and added to the SOP. Moreover, if an alarm system is not present to provide warning of loss of pressure, the magnehelic gauges should at least be labeled with the correct pressure values so that they can be observed at entry time.

Exhaust from the BSL-3 lab is 100% HEPA filtered by a filter bank in the penthouse, and pre-filters are present as well. As with the pre-filters and HEPA filters in the C^{14} lab hood exhausts, filter types and a change schedule should be determined and added to the SOP. Documentation of filter changes needs to be recorded. NWRC should verify that building maintenance accomplishes these tasks on a periodic basis.

- Recommendation #24. Determine the compliance requirements for filter types, filter change criteria, and pressure drops. Include in SOP for operation of the exhaust filter system. Develop recordkeeping on filter changes and (optionally) on pressure drops at BSL-3 entrance and filter bank.

Pocatello Supply Depot Site Visit

A site visit was conducted to inspect the Pocatello Supply Depot (PSD) located at 238 East Dillon St., Pocatello, ID. The site visit was conducted by James Dennison, CIH for Federal Occupational Health (FOH). The site visit was led by Mr. Steve Greiner. The visit was conducted from January 22-23, 2008.

The purpose of the site visit was to review the safety program for manufacturing chemicals. This included review of pertinent Standard Operating Procedures (SOPs), agency Directives,

internal written policies, manuals, and written plans, as well as inspecting the facility and operations within the facility for conformance to written programs and OSHA and EPA requirements (storage, inventory, use, disposal, safety, PPE, hazard communication/MSDS, etc.). Assessment of conformance to Good Laboratory Practices or Good Manufacturing Practices was not included.

In this site visit report, various comments and recommendations have been made. Some comments that are observational, or concern minor matters, have not been formalized into recommendations due to the small scope of the observation, or because they are covered by a broader recommendation made elsewhere in the report. Some other observations are covered by an optional action if there are different choices that can be made or the outcome of the problem resolution depends on information that is not available at this time. However, significant observations are noted with formal recommendations in bulleted text.

At PSD, wildlife damage management materials are manufactured and distributed. PSD is a non-profit entity controlled by the Pocatello Chamber of Commerce, employing four production workers and two administrative employees. In addition, the PSD is managed by a Federal USDA/APHIS employee. The assistance of the federal manager, Ms. Doris Zemlicka, and all of the staff at PSD was very helpful and appreciated during the site visit.

Document Review

The following documents were reviewed specifically in connection with PSD:

22. WS Directive: Mission and Philosophy of the WS Program
23. WS Directive: Pocatello Supply Depot (3.115)
24. WS Directive: Compliance with Federal, State and Local Laws and Regulations (2.210)
25. WS Directive: Safety (2.601)
26. WS Directive: WS Safety and Health Program (2.605)
27. PSD Pollution Prevention Plan, 4/16/07
28. PSD Accidental-Spill Prevention Plan, 3/27/07
29. Environmental Quality Assessment Final Report, dated 12/9/04
30. Industrial Hygiene Exposure Assessment Report, dated 8/2/05
31. Hazard Communication Program

Other than as noted below, the directives and SOPs appear to adequately address safety concerns at the facility. No recommended changes are noted except for the Hazard Communication Program which references Utah, and should be updated.

Inventory

Quarterly reports are made concerning inventory for chemicals of interest, including sodium nitrate. The inventory system for other chemicals is complex, time consuming, and prone to be somewhat inaccurate. PSD may want to consider implementing a system that is more computerized to both simplify the work of keeping inventory control and improve accuracy.

- Recommendation #25. PSD should consider a computerized chemical inventory tracking system.

Training

Training programs include safety, hazardous materials, and hazard communication training. While training appeared to be regular and was documented for 1999-2001, records of training have been sporadic or non-existent since then. A formal training program should be developed, including initial and annual training for inventory, hazardous waste, hazard communication, safety, hazardous waste, respirators and personal protective equipment, and spill control. It is preferable that some of the training be conducted by an on-site instructor so that site specific questions may be asked and answered. It may also be useful to have generic parts of the training offered via video or computer based programs, but in either case, it is beneficial to have content that is assessed at the end with some form of test of competency (i.e., was the critical parts of the material learned?) Records of training should be kept for all initial and annual trainings.

- Recommendation #26. Training program content should be formalized, provided annually or at appropriate intervals, and documented.

Exposure Assessment

Existing hazards have been assessed by Federal Occupation Health in a report dated August 2, 2005. In that exposure assessment, no significant exposures were reported. However, work load varies to a very great extent over the year, so it is unclear whether exposures were monitored on workdays where exposure could be expected to be near maximal. In addition, significant ventilation changes have been made since that time. Exposure for cyanide and strychnine on the days tested were well below OSHA Permissible Exposure Limits (PEL) (as well as corresponding Threshold Limit Values (TLV)). However, the situation for zinc phosphide is less clear. There are no PELs or TLVs for zinc phosphide, so the airborne exposure data were compared to PELs for zinc and phosphorus. Some published information indicates that zinc phosphide is converted in the body to phosphine gas. This may be the mode of toxic action in animals and why the compound can be used for animal control. The TLV for phosphine gas is much lower than that for zinc and phosphorus, so a lower acceptable exposure may be appropriate. The exposure data indicated that a significant exposure is possible, even when the phosphine issue is not considered. Based on this, additional exposure assessment and efforts to determine acceptable exposure levels should be made.

If it is difficult to predict when near maximal exposure will occur, Wildlife Services may consider contracting to have appropriate sampling equipment sent to the site so that monitoring can be conducted on representative days. Additional monitoring for zinc phosphide, cyanide, and strychnine should be done (2-3 days each) and the data analyzed to determine with statistical confidence whether employees are exposed to acceptable levels.

Due to the fact that all of these materials are powders, dusts, or some form of particulate material, wipe samples should be collected to determine whether chemical contamination in areas adjacent to the work areas is excessive. While housekeeping could be improved in some work areas (see below), chemical residues in the actual work area are acceptable as long as excessive and unnecessary levels do not occur. However, significant contamination of adjacent areas should not occur, and wipe samples can be used to determine this.

- Recommendation #27. Exposure to zinc phosphide, cyanide, and strychnine should be monitored again by a 3rd party if possible or, with outside technical support, by the existing staff. Wipe tests for surface contamination should also be conducted.

Chemical Emergencies/Spills

With numerous toxic chemicals present in relatively large quantities and the handling of these materials, small spills are somewhat inevitable and larger ones could also occur. PSD does not have clear guidelines for dealing with this issue. The criteria for the types of chemical spills that can be safely addressed by the on-site personnel needs to be developed. A policy that no spills will be addressed is possible, but impractical for a facility such a PSD. Is it acceptable to clean up 1 g, 10 g, 100 g, or 1000 g of cyanide? Or of zinc phosphide? Or other chemicals? The extent of permissible spill cleanup for each agent should be defined, as clearly smaller spills are addressed and potential spills that could need emergency response might occur. It was unclear whether staff had an SOP for spills. This should be included when addressing the criteria. Spill training would then be needed. In general, adequate spill cleanup supplies were present. Procedures for cleanup would be included in an SOP, (e.g., for a strychnine spill, use a HEPA vacuum).

- Recommendation #28. A formal spill response plan should be prepared that describes the size and extent of spills that will be addressed with in-house staff and the means and methods to be employed. This plan should be part of spill training for manufacturing staff.

Hazardous waste

Minimal hazardous waste was reportedly produced. No issues noted.

General safety concerns

Minor issues with items such as eye wash stations, bottled gases, chemical labeling and storage were discussed with on-site personnel. In general, safety issues appeared to be well managed. No issues noted that warrant specific mention.

Resources

Generally, resources are adequate as evidenced by most programs being adequate. It was reported that in addition to other duties, all of the environmental management duties were handled by the federal manager, including health and safety, inventory, Sara Title III reporting, hazardous waste, and all other environmental aspects of the operation. Many of these aspects require some form of recordkeeping and reporting, and it appeared that some of these records or reports were not complete or timely, due to the difficulty for any manager who does not normally perform these functions. There are a myriad of rules that need to be understood in order to comply with all requirements and while some resources are available to assist the federal manager, they are all off-site. An alternative that should be considered is for PSD to out-source the majority of the non-managerial recordkeeping, auditing, and reporting tasks that don't have to be done on a daily basis to a local consulting firm, if available, who can ensure that all of the deadlines are met with accurate reporting.

- Recommendation #29. PSD should consider out-sourcing environmental compliance work that can be performed on a periodic (e.g. quarterly) basis, while continuing to perform the day-to-day recordkeeping that flows into the in-house periodic compliance report systems.

Summary

Overall, ESH operations at both facilities are in essential compliance with Federal requirements and in conformance to CDC guidelines and other recommended work practice guidelines. With operations that involved so many staff members and diverse work activities that give rise to a myriad of potential hazards, it is not possible to have such a status that no improvements can be made. A number of possible improvements have been described in this report.

Areas with the best performance overall included waste management, operation of BSL-2 and BSL-3 laboratories, written plans and SOPs, exposure controls, medical monitoring, and spill response preparedness.

Areas where some of the improvements could be made generally included in training, inventory management/hazard communication, labeling, ventilation systems, chemical hygiene, and staff resources.

While all of the recommendations should be considered and implemented by Wildlife Services when feasible, the more immediate needs include the following recommendations. With regard to training programs, Recommendations #4-6 will help consolidate safety programs with on-going formalized training, job hazard analysis that incorporates the Chemical Hygiene Officer/Safety Officer for each facility with the activity manager so that input from both sides of the program are incorporated into safety planning, with on-going inspections for conformance to the SOPs.

Recommendations #16 and #29 pertain to staff resources of ESH programs at two Wildlife Services facilities. Providing improved resources as recommended would beneficially augment the existing staff's ability to manage the ESH programs that otherwise exist.

Recommendation #10 (and redundant Recommendation #24) address questions regarding acceptable criteria for operation of the exhaust systems with HEPA filters and tracking programs that should be addressed.

Recommendations #7 and #8 (and subsidiary Recommendations #17 and #25) are overlapping comments regarding apparent challenges Wildlife Services has in keeping track of chemical inventory and MSDS for the myriad of products needed during operations. Improvement in this area would enable Wildlife Services to better keep track of the chemical inventory, update MSDS information, and improve efficiency and accuracy in these processes.